REMARKS

Status of Claims

Claims 1-3, 5-13, 15-23 and 25-29 are pending in this application, of which claims 1, 12 and 21 are independent. Claim 29 has been added. Support for the amendment is found, for example, at paragraph [0056] of the specification. No new matter has been entered.

Rejection under 35 U.S.C. § 103(a)

Claims 1, 12, 13, and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent Application Publication JP H03-093695 (JP '695) in view of Japanese Patent Application Publication JP H03-075298 (Takahiro). Claims 2, 3, 5-11, 15-20, 22, 23 and 25-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '695 in view of Takahiro. These rejections are traversed for at least the following reasons.

Initially, it is noted that Applicants are submitting herewith the full English translations of JP H03-093695 and JP H03-075298 as an Information Disclosure Statement for Examiner's review.

JP '695 is directed to a method of forming a polycrystalline diamond layer on the substrate by vapor-phase synthesis. The purpose of JP '695 is to inexpensively provide a high-quality polycrystalline diamond having excellent hardness, toughness, heat conductivity and light permeability by removing specific crystal grains from a polycrystalline diamond layer grown on a substrate by vapor phase synthetic method and then producing a diamond on the substrate. *See*, English Abstract of JP '695. According to the method of JP '695, the polycrystalline diamond is first grown on a non-diamond substrate, such as Si, Mo, or SiC, by using vapor-phase synthesis, such as a plasma CVD method. Diamond grains in the polycrystalline diamond other than

diamond grains whose (100) crystal plane is parallel to the substrate intact are then removed. After removing the grains, polycrystalline diamond is grown by vapor-phase synthesis on the substrate having only diamond grains with (100) crystal plane. The grown diamond has high orientation of (100) plane. *See*, page 33, third full paragraph to page 35, second full paragraph of the English Translation of JP '695.

On the other hand, Takahiro is directed to a method of producing single crystal of high-pressure phase substrate, for example, diamond. The purpose of Takahiro is to obtain a large-size single crystal of a high-pressure phase substance. *See* English Abstract. According to the method of Takahiro, a plurality of single crystal diamond plates having the same crystal directions are disposed close to each other. Single crystal diamond is formed on the plurality of single crystal diamond plates by using a vapor phase growth method in order to form a single substrate. *See*, English Abstract.

The Examiner has asserted that JP '695 discloses a method of growing a polycrystalline diamond by using a layer of polycrystalline diamond as nucleation sites. The Examiner specifically asserts that JP '695 discloses a polycrystalline diamond layer with different orientations.

The Examiner conceded that JP '695 fails to disclose a nucleation site being single crystal diamond. Then, the Examiner relied on Takahiro asserting that Takahiro discloses the use of monocrystalline diamond as a substrate.

The Examiner concluded that it would have been obvious to one of skill in the art to modify the JP '695 by the teaching of Takahiro to use single crystal diamond base in order to ensure that the layer of diamonds ha uniform orientation. Applicants respectfully traverse the Examiner's assertion for at least the following reasons.

(1) JP '695 fails to disclose a diamond polycrystalline film of independent claims 1, 12 and 21.

JP '695 fails to disclose a diamond polycrystalline film having crystals ***with random orientation*** as recited by independent claims 1, 12 and 21. Although JP '695 uses the term "polycrystalline," JP '695 discloses a highly oriented polycrystalline diamond layer, not a diamond polycrystalline film having crystals ***with random orientation***.

The Examiner asserts that the diamond layer of JP '695 is of the polycrystalline layer. Although the Examiner acknowledges that JP '695 states that the diamond is high quality, in response to the Applicants' previous argument filed April 9, 2008, the Examiner asserted that JP '695 does not disclose that the diamond layer of JP '695 has a highly oriented polycrystalline diamond layer. The Examiner asserted that JP '695 does not use the phrase "highly oriented" because he does not see where in JP '695 teaches that the grown polycrystalline is considered to be highly oriented.

Applicants submit herewith the full English Translations of JP '695 and JP' 298 (Takahiro). JP '695 states, at page 31, third full paragraph of the English Translation of JP '695:

> That is, the present invention relates to a polycrystalline diamond wherein ***the strength of diffraction line of the (4,0,0) face is 20 or more*** when the strength of the diffraction line of the (1,1,1) face by X-ray diffraction is 100, and wherein ***the (4,0,0) face is aligned with the surface of the growth substrate***.(*emphasis added*).

Further, page 35, third full paragraph bridging to page 36 of the English Translation of JP '695 states:

> In a polycrystalline diamond of the present invention obtained by the method described above, the strength of diffraction line of (4,0,0) face is 20 or more when the strength of the diffraction line of the (1,1,1) face by X-ray diffraction is 100. Since according to ASTM X-ray diffraction data the diffraction strength of the (4,0,0) face of diamond powder in which the diamond drains have random orientation is 7 when the (1,0,0) is 100, a value of 20 and more ***indicates strong orientation***... (*emphasis added*).

Thus, JP '695 describes a "***strongly (highly) oriented***" polycrystalline diamond film on a

monocrystalline substrate of Si, Mo or SiC.

The fact that the polycrystalline diamond film of JP '695 is highly oriented is further evidenced by FIG. 3 of JP '695. FIG. 3 of JP '695 illustrates a schematic cross sectional view of the polycrystalline diamond film 2. Reference numeral 3 (shaded areas) indicates a diamond grains (crystals) having (1,0,0) orientation. *See*, page 41, first full paragraph and page 42 of the English Translation of JP '695. Existence of a plurality of grains (shaded areas) means that the film is polycrystalline diamond, but each of the grains has (1,0,0) orientation. Thus, it is clear that FIG. 3 of JP '695 indicates that the polycrystalline film of JP '695 has only crystals (or crystal grains) having (1,0,0) orientation.

In contrast, the polycrystalline film of claims 1, 12 and 21 has crystals (grains) ***with random orientation***. This means that the polycrystalline film of claims 1, 12 and 21 has a plurality of crystal grains with random orientations. By using the polycrystalline film having crystals with random orientation, it is possible to obtain a high toughness diamond composite substrate. *See*, paragraph [0039] of the present application.

As such, it is clear that, at a minimum, JP '695 fails to disclose a polycrystalline film having crystals ***with random orientation*** as recited by independent claims 1, 12 and 21. Since Takahiro is directed to a method of producing a single crystal diamond film on a single crystal diamond substrate, it is also clear that Takahiro fails to disclose a polycrystalline film having crystals with random orientation as recited by independent claims 1, 12 and 21.

For the foregoing reasons, the rejection does not present a *prima facie* case of obviousness of claims 1, 12 and 21 over the combined teachings of JP '695 and Takahiro. Since claims 2, 3, 5-11, 13, 15-20, 22, 23 and 25-28 depend upon either one of claims 1, 12 and 21, these claims are also patentable over the cited references for at least the same reasons as claims 1,

12 and 21.

(2) Combining JP '695 with Takahiro is not obvious.

It would not have been obvious to combine JP '695 with Takahiro because there is no motivation or suggestion to do so. Combining JP '695 and Takahiro would impair the purposes of both JP '695 and Takahiro. More specifically, JP '695 teaches away from the use of single crystalline substrate as disclosed by Takahiro.

As discussed above, JP '695 is directed to a method of forming a polycrystalline diamond on the non-diamond substrate by vapor-phase synthesis in order to obtain high quality polycrystalline diamond having a large area at a low cost. JP '695, at page 31, first full paragraph of the English Translation, states:

> The present invention resolves these problems and provides a high quality polycrystalline diamond with excellent hardness, toughness, heat conductivity and ***light permeability***, along with a method for manufacturing it ***inexpensively*** by vapor-phase synthesis (*emphasis added*).

Thus, using a single crystalline diamond used in Takahiro, which is well-known as an expensive material, would impair the purpose of JP '695.

Further, JP '695 states, at page 30, first paragraph of the English Translation:

> Natural ***single-crystal diamonds*** and artificial ***single-crystal diamonds*** synthesized under high pressure are currently being used as heatsinks in laser diodes and other semiconductors that require special heat dissipation properties, but such ***single crystal diamonds*** are extremely difficult to manufacture for electronic components, which require areas of at least several square millimeters, or ***optical components, which require transparency*** (*emphasis added*).

Therefore, JP '695 uses a single crystalline substrate other than diamond, i.e., Si, Mo or SiC. *See*, page 33, third full paragraph of the English Translation of JP '695. In fact, the optical property of the polycrystalline film of JP '695 is high. Page 36, first full paragraph of the English

Translation of '695 states:

> Since the polycrystalline diamond of the present invention has a strong (1,0,0) face orientation, it exhibits excellent property of 30% or more transmittance of argon laser light (514.5 μm [sic]) and 5 W/cm· K heat conductivity. Such physical properties have not been obtained by conventional products.

It is clear that JP '695 never intends to use a single crystal diamond substrate to form a polycrystalline diamond layer thereon because of the above disclosed problems. Further, if a small single crystalline diamond substrate as disclosed in Takahiro were used as the substrate of JP '695 in producing polycrystalline diamond film, the purpose of JP '695 would not be achieved and the optical property of the polycrystalline film would be poor.

As such, it is clear that JP '695 teaches away from using a single crystalline diamond as the substrate in producing a polycrystalline diamond film. It is also clear that, since the purpose of Takahiro is to obtain single crystal diamond, the method of producing polycrystalline diamond of JP '695 would never be adopted in the technology of Takahiro. Although Takahiro discloses the use of cubic boron nitride, the cubic boron nitride is chosen because it has small lattice mismatch. *See*, page 7, last full paragraph of the English Translation of Takahiro (JP '298). Takahiro still focuses on forming a single crystalline diamond film.

Accordingly, it would not have been obvious to combine JP '695 with Takahiro because there is no motivation or suggestion to do so and JP '695 in fact teaches away to adopt the teachings of Takahiro.

For the foregoing reasons, the rejection does not present a *prima facie* case of obviousness of claims 1, 12 and 21 over the combined teachings of JP '695 and Takahiro. Since claims 2, 3, 5-11, 13, 15-20, 22, 23 and 25-28 depend upon one of claims 1, 12 and 21, these claims are also patentable over the cited references for at least the same reasons as claims 1, 12 and 21.

Based on the foregoing, Applicants respectfully request that the Examiner withdraw the rejections of Claims 1-3, 5-13, 15-23 and 25-28 under 35 U.S.C. § 103(a).

New Claim

Since new claim 29 depends upon claim 1, this claim is patentable over the cited references for at least the same reasons as claim 1.

CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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